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CREAM-STANDARDIZATION TABLES

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INTRODUCTION

The modern practice of carefully adjusting the composition of dairy products to conform to certain specific requirements is commonly called standardization. This practice is essential in establishing uniformity of composition, and while it has secured greater public confidence in and more frequent use of different types of market cream and ice cream, and has unquestionably become a fundamental and indispensable dairy practice, it is often difficult on account of the numerous and complex calculations necessary in making the standardization.

It is well known that a small mistake made in butterfat standardizations may be reflected in the quality of cream and ice cream. Standardization problems are especially difficult for those who are not familiar with the methods taught in dairy schools for calculating accurately the quantities of different milks and creams required to prepare cream containing a definite percentage of fat.

Many problems of cream standardization might be simplified by a series of tables showing the relative proportions of milk and cream of different fat content required to prepare creams of definite and lesser fat content than the original cream.

The following cream-standardization tables have been prepared for the purpose of making cream standardization easier and simpler.

METHOD OF USING CREAM-STANDARDIZATION TABLES

The cream-standardization tables given herein are based on a 100-pound mixture, in order that the numerical relationship may represent the percentage of the products used in standardizing any quantity of cream. The proportions have been calculated for each 2 per cent variation of fat in creams testing from 18 to 50 per cent fat, in the preparation of 17 different types of cream, with even fat values ranging from 16 to 48 per cent, inclusive. This has been done for mixtures of skim milk and eight different whole milks ranging in fat content from 3.4 to 4.8 per cent inclusive.

For these different milks nine cream-standardization tables have been prepared. Each of these tables will show the quantity of any type of cream within the ranges given that is needed in preparing a cream of a lesser fat content. For instance, suppose that 10 gallons of cream containing 20 per cent fat is to be prepared from cream testing 38 per cent fat and milk testing 3.8 per cent fat. On referring to Table 10, the exact weight of this quantity of 20 per cent cream at 50° F. is found to be, in round numbers, 85 pounds; and then to Table 4, the proportion of 38 per cent cream required to make a 20 per cent cream is found to be 47.37 per cent of the total weight.

After referring to Tables 10 and 4 in this way, only three simple calculations are involved in the standardization:

(1) $10\times 8.48=84.8$ total weight of 10 gallons of 20 per cent cream.
(2) $\frac{85\times 47.37}{100}=40.26$ pounds of 38 per cent cream.
(3) $85-40.26=44.74$ pounds of 3.8 per cent milk.

These tables are also useful for calculating the difference between the costs of creams prepared from different milks and creams. For example, if the market price of whole milk containing 4 per cent fat is 33 cents a gallon or $3.84 per hundred pounds, and cream containing 40 per cent fat is $16 per 10-gallon can weighing 84 pounds net, what would be the difference in cost for 100 pounds of 20 per cent cream when standardized with skim milk valued at 50 cents per hundred pounds instead of with whole milk?

By turning to Table 1, it is found that the proportions of 40 per cent cream and skim milk necessary for making 20 per cent cream are 50:50, and Table 5 shows the proportions of cream and whole milk to be 44.4:55.6, respectively. The comparative costs may then be readily found as follows:

50 pounds of 40 per cent cream at $0.202	$10. 10
50 pounds of skim milk at $0.005	0. 25
	10. 35
44.4 pounds of 40 per cent cream at $0.202	8. 97
55.6 pounds of whole milk at $0.0384	2. 13
	11. 10
100 pounds of a mixture of cream and whole milk	11. 10
100 pounds of a mixture of cream and skim milk	10. 35
Difference in cost	0. 75

Such comparisons showing differences in costs may be very profitable in making cream standardizations.

As most cream standardizations are made entirely from original milks and creams having butterfat analyses within the ranges shown in these tables, the tables probably cover at least 80 per cent of all cream-standardization requirements.

It is estimated that the tables will eliminate problems in division and reduce the number of calculations, including multiplication, addition, and subtraction, 50 to 75 per cent. Furthermore, their use may be the means of eliminating many errors in the calculations.

These tables may have practical application for both the purchaser and plant superintendent in a number of ways:

Suppose the plant superintendent wants to consign just enough 40 per cent cream, to make with whole milk containing 3.4 per cent fat, 150 gallons of cream containing 22 per cent fat. By referring to Table 10, the total weight of 150 gallons of 22 per cent cream is found to be 1,270.5 pounds. Then by referring to Table 2, the proportion of 40 per cent cream required to make 22 per cent cream is found to be 50.82 per cent. The total quantity of 40 per cent cream desired is, therefore, 50.82 per cent of 1,270.5 or 645.66 pounds.

Suppose an inventory shows that only 40 gallons of 40 per cent cream is available, and the superintendent wants to know how much 18 per cent cream this amount of 40 per cent cream represents when standardized with whole milk testing 4.2 per cent fat. By turning to Table 6 he finds the proportions for 40 per cent cream and 4.2 per cent milk are approximately 38.5 and 61.5 respectively; hence by applying the rule of simple proportion, 38.5:61.5 :: 40 gallons : X, he finds that $X = 64$ gallons of 4.2 per cent milk, or about 104 gallons of 18 per cent cream.

Table 10 shows the theoretical percentages or approximate averages of serum solids in different milks and creams, with the specific gravity and weight per gallon at two temperatures for each 4 per cent variation in fat. This table is useful in ascertaining the approximate amount of serum solids and total solids content of various creams, and particularly the relative weights per gallon of different creams.

CORRECT STANDARDIZATION OF CREAM

In making any cream standardization, accuracy in all of the following three operations is very important: (1) Determining the butterfat content of the original milk and cream, (2) calculating the proportions of the milk and cream, and (3) weighing the proportions.

The butterfat content of standardized cream should always be a trifle above the percentage desired rather than below. In other words, it is advisable to recognize a tolerance of from 0.1 to 0.5 per cent above the percentage required, but wider variations, if they occur below the desired percentage, mean dissatisfaction on the part of the buyer, due to cheapening the product, or, if above it, cause an unnecessary loss to the dairy or the plant selling the cream.

Constant difficulty with wide variations in the butterfat content of standardized creams usually indicates inaccuracy in one or more of these three operations.

If each operation has been done carefully and accurately it is not likely that the butterfat content of the standardized cream will be far from what it should be. However, in preparing large quantities of cream it is always well to verify each standardization with a check test.

TABLE 1.—*Cream standardization with skim milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts, or pounds per 100 pounds of mixture																	
Cream	50	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100
Milk	0	68	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0
Cream	48	33.33	37.5	41.67	45.83	50.00	54.17	58.33	62.50	66.67	70.83	75.00	79.16	83.34	87.5	91.67	95.83	100	
Milk	0	66.67	62.5	58.33	54.17	50.00	45.83	41.67	37.50	33.33	29.17	25.00	20.84	16.66	12.5	8.33	4.17	0	
Cream	46	34.83	39.13	43.48	47.82	52.17	56.52	60.87	65.22	69.57	73.91	78.26	82.61	86.96	91.30	95.65	100		
Milk	0	65.17	60.87	56.52	52.18	47.83	43.48	39.13	34.78	30.43	26.09	21.74	17.39	13.04	8.70	4.35	0		
Cream	44	36.36	40.90	45.46	50.00	54.50	59.09	63.64	68.18	72.73	77.41	81.82	86.36	90.91	95.00	100			
Milk	0	63.64	59.10	54.54	50.00	45.50	40.91	36.36	31.82	27.27	22.59	18.18	13.64	9.09	5.00	0			
Cream	42	38.10	42.86	47.62	52.38	57.14	61.90	66.19	71.43	76.20	80.95	85.71	90.48	95.24	100				
Milk	0	61.90	57.14	52.38	47.62	42.86	38.10	33.81	28.57	23.80	19.05	14.29	9.52	4.76	0				
Cream	40	40	45	50	55	60	65	70	75	80	85	90	95	100					
Milk	0	60	55	50	45	40	35	60	25	20	15	10	5	0					
Cream	38	42.22	47.50	52.78	58.04	63.33	67.60	73.88	79.15	84.43	89.76	94.72	100						
Milk	0	57.78	52.50	47.22	41.96	36.67	32.40	26.12	20.85	15.57	10.24	5.28	0						
Cream	36	44.44	50.00	55.56	61.09	66.66	70.20	77.76	83.31	88.86	94.52	100							
Milk	0	55.56	50.00	44.44	38.91	33.34	29.80	22.24	16.69	11.14	5.48	0							
Cream	34	47.22	53.12	59.78	64.42	70.83	75.72	82.48	88.55	94.11	100								
Milk	0	52.78	46.88	40.22	35.58	29.17	24.28	17.52	11.45	5.89	0								
Cream	32	50.00	56.25	64.00	67.75	75.00	81.25	87.50	93.75	100									
Milk	0	50.00	43.75	36.00	32.25	25.00	18.75	12.50	6.25	0									
Cream	30	53.57	60.26	66.71	73.15	80.35	87.05	93.24	100										
Milk	0	46.43	39.74	33.29	26.85	19.65	12.95	6.76	0										
Cream	28	57.14	64.28	71.42	78.56	85.70	92.85	100											
Milk	0	42.86	35.72	28.58	21.44	14.30	7.15	0											
Cream	26	61.90	69.63	77.27	85.10	92.30	100												
Milk	0	38.10	30.37	22.73	14.90	7.70	0												
Cream	24	66.66	74.99	83.32	91.65	100													
Milk	0	33.34	25.01	16.68	8.35	0													
Cream	22	73.33	82.49	90.90	100														
Milk	0	26.67	17.51	9.10	0														
Cream	20	80.00	90.00	100															
Milk	0	20.00	10.00	0															
Cream	18	88.89	100																
Milk	0	11.11	0																

TABLE 2.—*Cream standardization with 3.4 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts, or pounds per 100 pounds of mixture																	
Cream	50	27.04	31.33	35.62	39.91	44.21	48.50	52.79	57.08	61.37	65.66	69.96	74.25	78.54	82.83	87.12	91.42	95.71	100
Milk	3.4	72.96	68.67	64.38	60.09	55.79	51.50	47.21	42.92	38.63	34.34	30.04	25.75	21.46	17.17	12.88	8.58	4.29	0
Cream	48	28.25	32.73	37.22	41.70	46.19	50.67	55.16	59.64	64.12	68.61	73.09	77.58	82.06	86.55	91.03	95.51	100	
Milk	3.4	71.75	67.27	62.78	58.30	53.81	49.33	44.84	40.36	35.88	31.39	26.91	22.42	17.94	13.45	8.97	4.49	0	
Cream	46	29.58	34.27	38.97	43.66	48.36	53.05	57.75	62.44	67.14	71.83	76.53	81.22	85.91	90.61	95.30	100		
Milk	3.4	70.42	65.73	61.03	56.34	51.64	46.95	42.25	37.56	32.86	28.17	23.47	18.78	14.09	9.39	4.70	0		
Cream	44	31.03	35.96	40.89	45.81	50.74	55.66	60.59	65.52	70.44	75.37	80.29	85.22	90.15	95.07	100			
Milk	3.4	68.97	64.04	59.11	54.19	49.26	44.34	39.41	34.48	29.56	24.63	19.71	14.78	9.85	4.93	0			
Cream	42	32.64	37.82	43.00	48.19	53.37	58.55	63.73	68.91	74.09	79.27	84.45	89.63	94.82	100				
Milk	3.4	67.36	62.18	57.00	51.81	46.63	41.45	36.27	31.09	25.91	20.73	15.55	10.37	5.18	0				
Cream	40	34.43	39.89	45.35	50.82	56.28	61.75	67.21	72.68	78.14	83.61	89.07	94.53	100					
Milk	3.4	65.57	60.11	54.65	49.18	43.72	38.25	32.79	27.32	21.86	16.39	10.93	5.47	0					
Cream	38	36.42	42.20	47.98	53.76	59.54	65.32	71.10	76.88	82.66	88.44	94.22	100						
Milk	3.4	63.58	57.80	52.02	46.24	40.46	34.68	28.90	23.12	17.34	11.55	5.78	0						
Cream	36	38.65	44.78	50.92	57.05	63.19	69.32	75.46	81.59	87.73	93.86	100							
Milk	3.4	61.35	55.22	49.08	42.95	36.81	30.68	24.54	18.41	12.27	6.14	0							
Cream	34	41.18	47.71	54.25	60.78	67.32	73.85	80.39	86.93	93.46	100								
Milk	3.4	58.82	52.29	45.75	39.22	32.68	26.15	19.61	13.07	6.54	0								
Cream	32	44.06	51.05	58.04	65.03	72.03	79.02	86.01	93.00	100									
Milk	3.4	55.94	48.95	41.96	34.97	27.97	20.98	13.99	7.00	0									
Cream	30	47.37	54.89	62.92	69.92	77.44	84.96	92.48	100										
Milk	3.4	52.63	45.11	37.08	30.08	22.56	15.04	7.52	0										
Cream	28	51.22	59.35	67.48	75.61	83.74	91.87	100											
Milk	3.4	48.78	40.65	32.52	24.39	16.26	8.13	0											
Cream	26	55.75	64.60	73.45	82.30	91.15	100												
Milk	3.4	44.25	35.40	26.55	17.70	8.85	0												
Cream	24	61.16	70.87	80.58	90.29	100													
Milk	3.4	38.84	29.13	19.42	9.71	0													
Cream	22	67.74	78.49	89.25	100														
Milk	3.4	32.26	21.51	10.75	0														
Cream	20	75.90	87.95	100															
Milk	3.4	24.10	12.05	0															
Cream	18	86.30	100																
Milk	3.4	13.70	0																

TABLE 3.—*Cream standardization with 3.6 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts, or pounds per 100 pounds of mixture																	
Cream	50	26.72	31.03	35.34	39.65	43.96	48.27	52.58	56.89	61.20	65.51	69.83	74.14	78.45	82.07	87.07	91.38	95.69	100
Milk	3.6	73.28	68.97	64.66	60.35	56.04	51.73	47.42	43.11	38.80	34.49	30.17	25.86	21.55	17.93	12.93	8.62	4.31	0
Cream	48	27.93	32.43	36.94	41.44	45.94	50.45	54.95	59.46	63.96	68.47	72.97	77.48	81.89	86.48	90.99	95.49	100	
Milk	3.6	72.07	67.57	63.06	58.56	54.06	49.55	45.05	40.54	36.04	31.53	27.03	22.52	18.11	13.52	9.01	4.51	0	
Cream	46	29.24	33.96	38.68	43.39	48.11	52.83	57.54	62.26	66.98	71.70	76.41	81.13	85.85	90.56	95.28	100		
Milk	3.6	70.76	66.04	61.32	56.61	51.89	47.17	42.46	37.74	33.02	28.30	23.59	18.87	14.15	9.44	4.72	0		
Cream	44	30.69	35.64	40.59	45.54	50.49	55.44	60.39	65.35	70.29	75.25	80.20	85.15	90.10	95.05	100			
Milk	3.6	69.31	64.36	59.41	54.46	49.51	44.56	39.61	34.65	29.71	24.75	19.80	14.85	9.90	4.95	0			
Cream	42	32.29	37.50	42.71	47.91	53.12	58.33	63.54	68.75	73.96	79.16	84.37	89.58	94.79	100				
Milk	3.6	67.71	62.50	57.29	52.09	46.88	41.67	36.46	31.25	26.04	20.84	15.63	10.42	5.21	0				
Cream	40	34.06	39.56	45.05	50.54	56.04	61.53	67.03	72.52	78.01	83.51	89.00	94.50	100					
Milk	3.6	65.94	60.44	54.95	49.46	43.96	38.47	32.97	27.48	21.99	16.49	11.00	5.50	0					
Cream	38	36.05	41.86	47.67	53.49	59.30	65.12	70.73	76.74	82.56	88.37	94.19	100						
Milk	3.6	63.95	58.14	52.33	46.51	40.70	34.88	29.27	23.26	17.44	11.63	5.81	0						
Cream	36	38.27	44.44	50.61	56.95	62.95	69.13	75.30	81.47	87.64	93.81	100							
Milk	3.6	61.73	55.56	49.39	43.05	37.05	30.87	24.70	18.53	12.36	6.19	0							
Cream	34	40.78	47.36	53.94	60.52	67.09	73.67	80.25	86.83	93.41	100								
Milk	3.6	59.22	52.64	46.06	39.48	32.91	26.33	19.75	13.17	6.59	0								
Cream	32	43.67	50.70	57.74	64.79	71.83	78.87	85.91	92.95	100									
Milk	3.6	56.33	49.30	42.26	35.21	28.17	21.13	14.09	7.05	0									
Cream	30	46.96	54.53	62.11	69.68	77.25	84.83	92.40	100										
Milk	3.6	53.04	45.47	37.89	30.32	22.75	15.17	7.60	0										
Cream	28	50.82	59.01	67.21	75.40	83.60	91.80	100											
Milk	3.6	49.18	40.99	32.79	24.60	16.40	8.20	0											
Cream	26	55.35	64.28	73.21	82.14	91.07	100												
Milk	3.6	44.65	35.72	26.79	17.86	8.93	0												
Cream	24	60.78	70.59	80.39	90.20	100													
Milk	3.6	39.22	29.41	19.61	9.80	0													
Cream	22	67.38	78.25	89.12	100														
Milk	3.6	32.62	21.75	10.88	0														
Cream	20	75.60	87.80	100															
Milk	3.6	24.40	12.20	0															
Cream	18	86.10	100																
Milk	3.6	13.90	0																

TABLE 4.—*Cream standardization with 3.8 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts, or pounds per 100 pounds of mixture																	
Cream	50	26.41	30.73	35.06	39.39	43.72	48.05	52.38	56.71	61.04	65.37	69.70	74.02	78.35	82.68	87.01	91.34	95.67	100
Milk	3.8	73.59	69.27	64.94	60.61	56.28	51.95	47.62	43.29	38.96	34.63	30.30	25.98	21.65	17.32	12.99	8.66	4.33	0
Cream	48	27.60	32.13	36.65	41.17	45.70	50.22	54.75	59.27	63.80	68.32	72.85	77.37	81.90	86.42	90.95	95.47	100	
Milk	3.8	72.40	67.87	63.35	58.83	54.30	49.78	45.25	40.73	36.20	31.68	27.15	22.73	18.10	13.58	9.05	4.53	0	
Cream	46	28.91	33.65	38.39	43.13	47.86	52.60	57.43	62.08	66.82	71.56	76.30	81.04	85.78	90.52	95.26	100		
Milk	3.8	71.09	66.35	61.61	56.87	52.14	47.40	42.57	37.92	33.18	28.44	23.70	18.96	14.22	9.48	4.74	0		
Cream	44	30.35	35.32	40.30	45.27	50.25	55.22	60.20	65.17	70.15	75.12	80.10	85.07	90.05	95.02	100			
Milk	3.8	69.65	64.68	59.70	54.73	49.75	44.78	39.80	34.83	29.85	24.88	19.90	14.93	9.95	4.98	0			
Cream	42	31.94	37.17	42.41	47.64	52.88	58.11	63.35	68.59	73.82	79.06	84.29	89.53	94.76	100				
Milk	3.8	68.16	62.83	57.59	52.36	47.12	41.89	36.65	31.41	26.18	20.94	15.71	10.47	5.24	0				
Cream	40	33.70	39.22	44.74	50.27	55.79	61.32	66.84	72.36	77.89	83.41	88.94	94.46	100					
Milk	3.8	66.30	60.78	55.26	49.73	44.21	38.68	33.16	27.64	22.11	16.59	11.06	5.54	0					
Cream	38	35.67	41.52	47.37	53.22	59.06	64.91	70.76	76.61	82.46	88.30	94.15	100						
Milk	3.8	64.33	58.48	52.63	46.78	40.94	35.09	29.24	23.39	17.54	11.70	5.85	0						
Cream	36	37.88	44.09	50.30	56.51	62.72	68.93	75.14	81.35	87.56	93.77	100							
Milk	3.8	62.12	55.91	49.70	43.49	37.28	31.07	24.86	18.65	12.44	6.23	0							
Cream	34	40.39	47.02	53.64	60.26	66.88	73.50	80.13	86.75	93.37	100								
Milk	3.8	59.61	52.98	46.36	39.74	33.12	26.50	19.87	13.25	6.63	0								
Cream	32	43.25	50.34	57.43	64.52	71.61	78.70	85.79	92.87	100									
Milk	3.8	56.75	49.66	42.57	35.48	28.39	21.30	14.21	7.13	0									
Cream	30	46.55	54.19	61.82	69.45	77.08	84.72	92.35	100										
Milk	3.8	53.45	45.81	38.18	30.55	22.92	15.28	7.65	0										
Cream	28	50.41	58.67	66.94	75.20	83.47	91.73	100											
Milk	3.8	49.59	41.33	33.06	24.80	16.53	8.27	0											
Cream	26	54.95	63.96	72.96	81.97	90.98	100												
Milk	3.8	45.05	36.04	27.04	18.03	9.02	0												
Cream	24	60.39	70.29	80.19	90.09	100													
Milk	3.8	39.61	29.71	19.81	9.91	0													
Cream	22	69.03	78.01	89.00	100														
Milk	3.8	30.97	21.99	11.00	0														
Cream	20	75.31	87.66	100															
Milk	3.8	24.69	12.34	0															
Cream	18	85.91	100																
Milk	3.8	14.09	0																

TABLE 5.—*Cream standardization with 4 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts or pounds per 100 pounds of mixture																	
Cream	50	26.09	30.43	34.78	39.13	43.48	47.82	52.17	56.52	60.87	65.22	69.56	73.91	78.26	82.61	86.96	91.30	95.65	100
Milk	4	73.91	69.57	65.22	60.87	56.52	52.18	47.83	43.48	39.13	34.78	30.44	26.09	21.74	17.39	13.04	8.70	4.35	0
Cream	48	27.27	31.82	36.36	40.91	45.45	50.00	54.54	59.09	63.63	68.18	72.73	77.27	81.82	86.36	90.91	95.45	100	
Milk	4	72.73	68.18	63.64	59.09	54.55	50.00	45.46	40.91	36.37	31.82	27.27	22.73	18.18	13.64	9.09	4.55	0	
Cream	46	28.57	33.33	38.09	42.86	47.62	52.38	57.14	61.90	66.66	71.43	78.57	80.95	85.71	90.47	95.24	100		
Milk	4	71.43	66.67	61.91	57.14	52.38	47.62	42.86	38.10	33.34	28.57	21.43	19.05	14.29	9.53	4.76	0		
Cream	44	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100			
Milk	4	70.00	65.00	60.00	55.00	50.00	45.00	40.00	35.00	30.00	25.00	20.00	15.00	10.00	5.00	0			
Cream	42	31.58	36.84	42.10	47.37	52.63	57.89	63.16	68.42	73.68	78.94	84.21	89.47	94.73	100				
Milk	4	68.42	63.16	57.90	52.63	47.37	42.11	36.84	31.58	26.32	21.06	15.79	10.53	5.27	0				
Cream	40	33.34	38.88	44.43	50.00	55.54	61.09	66.65	72.20	77.76	83.33	88.89	94.42	100					
Milk	4	66.66	61.12	55.57	50.00	44.46	38.91	33.35	27.80	22.24	16.67	11.11	5.58	0					
Cream	38	35.29	41.17	47.06	52.94	58.82	64.70	70.58	76.47	82.35	88.23	94.11	100						
Milk	4	64.71	58.83	52.94	47.06	41.18	35.30	29.42	23.53	17.65	11.77	5.89	0						
Cream	36	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75	100							
Milk	4	62.50	56.25	50.00	43.75	37.50	31.25	25.00	18.75	12.50	6.25	0							
Cream	34	40.00	46.66	53.33	60.00	66.66	73.33	80.00	86.66	93.32	100								
Milk	4	60.00	53.34	46.67	40.00	33.34	26.67	20.00	13.34	6.68	0								
Cream	32	42.85	50.00	57.14	64.28	71.42	78.56	85.70	92.85	100									
Milk	4	57.15	50.00	42.86	35.72	28.58	21.44	14.30	7.15	0									
Cream	30	46.15	53.84	61.54	69.23	76.92	84.61	92.30	100										
Milk	4	53.85	46.16	38.46	30.77	23.08	15.39	7.70	0										
Cream	28	50.00	58.32	66.66	74.99	83.32	91.65	100											
Milk	4	50.00	41.68	33.34	25.01	16.68	8.35	0											
Cream	26	54.54	63.63	72.72	81.81	90.90	100												
Milk	4	45.46	36.37	27.28	18.19	9.10	0												
Cream	24	60.00	70.00	80.00	90.00	100													
Milk	4	40.00	30.00	20.00	10.00	0													
Cream	22	66.67	77.77	88.88	100														
Milk	4	33.33	22.23	11.12	0														
Cream	20	75.00	87.50	100															
Milk	4	25.00	12.50	0															
Cream	18	85.69	100																
Milk	4	14.31	0																

TABLE 6.—*Cream standardization with 4.2 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts or pounds per 100 pounds of mixture																	
Cream	50	25.76	30.13	34.50	38.86	43.23	47.60	51.96	56.33	60.70	65.07	69.43	73.80	78.17	82.53	86.90	91.27	95.63	100
Milk	4.2	74.24	69.87	65.50	61.14	56.77	52.40	48.04	43.67	39.30	34.93	30.57	26.20	21.83	17.47	13.10	8.73	4.37	0
Cream	48	26.94	31.51	36.07	40.64	45.21	49.77	54.34	58.90	63.47	68.04	72.60	77.17	81.73	86.30	90.87	95.43	100	
Milk	4.2	73.06	68.49	63.93	59.36	54.79	50.23	45.66	41.10	36.53	31.96	27.40	22.83	18.27	13.70	9.13	4.57	0	
Cream	46	28.23	33.01	37.80	42.58	47.37	52.15	56.94	61.72	66.51	71.29	76.08	80.36	85.64	90.43	95.21	100		
Milk	4.2	71.77	66.99	62.20	57.42	52.63	47.85	43.06	38.28	33.49	28.71	23.92	19.14	14.36	9.57	4.79	0		
Cream	44	29.65	34.67	39.70	44.72	49.75	54.77	59.80	64.82	69.85	74.87	79.90	84.92	89.95	94.97	100			
Milk	4.2	70.35	65.33	60.30	55.28	50.25	45.23	40.20	35.18	30.15	25.13	20.10	15.08	10.05	5.03	0			
Cream	42	31.22	36.51	41.80	47.09	52.38	57.67	62.96	68.25	73.54	78.84	84.13	89.42	94.71	100				
Milk	4.2	68.78	63.49	58.20	52.91	47.62	42.33	37.04	31.75	26.46	21.16	15.87	10.58	5.29	0				
Cream	40	32.96	38.55	44.13	49.72	55.31	60.89	66.48	72.06	77.65	83.24	88.82	94.41	100					
Milk	4.2	67.04	61.45	55.87	50.28	44.69	39.11	33.51	27.94	22.35	16.76	11.18	5.59	0					
Cream	38	34.91	40.83	46.74	52.66	58.58	64.50	70.41	76.33	82.25	88.16	94.08	100						
Milk	4.2	65.09	59.17	53.26	47.34	41.42	35.50	29.59	23.67	17.75	11.84	5.92	0						
Cream	36	37.11	43.40	49.68	55.97	62.26	68.55	74.84	81.13	87.42	93.71	100							
Milk	4.2	62.89	56.60	50.32	44.03	37.74	31.45	25.16	18.87	12.58	6.29	0							
Cream	34	39.60	46.31	53.02	59.73	66.44	73.15	79.87	86.58	93.29	100								
Milk	4.2	60.40	53.69	46.98	40.27	33.56	26.85	20.13	13.42	6.71	0								
Cream	32	42.45	49.64	56.83	64.03	71.22	78.42	85.61	92.81	100									
Milk	4.2	57.55	50.36	43.17	35.97	28.78	21.58	14.39	7.19	0									
Cream	30	45.74	53.49	61.24	68.99	76.74	84.49	92.25	100										
Milk	4.2	54.26	46.51	38.76	31.01	23.26	15.51	7.75	0										
Cream	28	49.58	57.98	66.39	74.79	83.19	91.59	100											
Milk	4.2	50.42	42.02	33.61	25.21	16.81	8.41	0											
Cream	26	54.13	63.30	72.48	81.65	90.82	100												
Milk	4.2	45.87	36.70	27.52	18.35	9.18	0												
Cream	24	59.60	69.70	79.80	89.90	100													
Milk	4.2	40.40	30.30	20.20	10.10	0													
Cream	22	66.29	77.53	88.76	100														
Milk	4.2	33.71	22.47	11.24	0														
Cream	20	74.68	87.34	100															
Milk	4.2	25.32	12.66	0															
Cream	18	85.51	100																
Milk	4.2	14.49	0																

TABLE 7.—*Cream standardization with 4.4 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts or pounds per 100 pounds of mixture																	
Cream	50	25.44	29.82	34.21	38.60	42.98	47.37	51.75	56.14	60.52	64.91	69.30	73.68	78.07	82.45	86.84	91.22	95.61	100
Milk	4.4	74.56	70.18	65.79	61.40	57.02	52.63	48.25	43.86	39.48	35.09	30.70	26.32	21.93	17.55	13.16	8.78	4.39	0
Cream	48	26.60	31.19	35.78	40.37	44.95	49.54	54.13	58.71	63.30	67.89	72.47	77.06	81.65	86.24	90.82	95.41	100	
Milk	4.4	73.40	68.81	74.22	59.63	55.05	50.46	45.87	41.29	36.70	32.11	27.53	22.94	18.35	13.76	9.18	4.59	0	
Cream	46	27.88	32.69	37.50	42.31	47.11	51.92	56.73	61.54	66.34	71.15	75.96	80.77	85.58	90.38	95.19	100		
Milk	4.4	72.12	67.31	62.50	57.69	52.89	48.08	43.27	38.46	33.66	28.85	24.04	19.23	14.42	9.62	4.81	0		
Cream	44	29.29	34.34	39.39	44.44	49.49	54.54	59.59	64.65	69.70	74.75	79.80	84.85	89.90	94.95	100			
Milk	4.4	70.71	65.66	60.61	55.56	50.51	45.46	40.41	35.35	30.30	25.25	20.20	15.15	10.10	5.05	0			
Cream	42	30.85	36.17	41.49	46.81	52.13	57.45	62.76	68.08	73.40	78.72	84.04	89.36	94.68	100				
Milk	4.4	69.15	63.83	58.51	53.19	47.87	42.55	37.24	31.92	26.60	21.28	15.96	10.64	5.32	0				
Cream	40	32.58	38.20	43.82	49.44	55.05	60.67	66.29	71.91	77.53	83.14	88.76	94.38	100					
Milk	4.4	67.42	61.80	56.18	50.56	44.95	39.33	33.71	28.09	22.47	16.86	11.24	5.62	0					
Cream	38	34.52	40.47	46.43	52.38	58.33	64.28	70.24	76.19	82.14	88.09	94.04	100						
Milk	4.4	65.48	59.53	53.57	47.62	41.67	35.72	29.76	23.81	17.86	11.91	5.96	0						
Cream	36	36.71	43.04	49.37	55.70	62.02	68.35	74.68	81.01	87.34	93.67	100							
Milk	4.4	63.29	56.96	50.63	44.30	37.98	31.65	25.32	18.99	12.66	6.33	0							
Cream	34	39.19	45.94	52.70	59.46	66.21	72.97	79.73	86.48	93.24	100								
Milk	4.4	60.81	54.06	47.30	40.54	33.79	27.03	20.27	13.52	6.76	0								
Cream	32	42.03	49.27	56.52	63.77	71.01	78.26	85.51	92.75	100									
Milk	4.4	57.97	50.73	43.48	36.23	28.99	21.74	14.49	7.25	0									
Cream	30	45.31	53.12	60.94	68.75	76.56	84.37	92.19	100										
Milk	4.4	54.69	46.88	39.06	31.25	23.44	15.63	7.81	0										
Cream	28	49.15	57.63	66.10	74.57	83.05	91.52	100											
Milk	4.4	50.85	42.37	33.90	25.43	16.95	9.48	0											
Cream	26	53.70	62.96	72.22	81.48	90.74	100												
Milk	4.4	46.30	37.04	27.78	18.52	9.26	0												
Cream	24	59.18	69.39	79.59	89.80	100													
Milk	4.4	40.82	30.61	20.41	10.20	0													
Cream	22	65.91	77.27	88.64	100														
Milk	4.4	34.09	22.73	11.36	0														
Cream	20	74.36	87.18	100															
Milk	4.4	25.64	12.82	0															
Cream	18	85.29	100																
Milk	4.4	14.71	0																

Table 8.—*Cream standardization with 4.6 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts or pounds per 100 pounds of mixture																	
Cream	50	25.11	29.51	33.92	38.33	42.73	47.14	51.54	55.95	60.35	64.76	69.16	73.57	77.97	82.38	86.78	91.19	95.59	100
Milk	4.6	74.89	70.49	66.08	61.67	57.27	52.86	48.46	44.05	39.65	35.24	30.84	26.43	22.03	17.62	13.22	8.81	4.41	0
Cream	48	26.27	30.87	35.48	40.09	44.70	49.31	53.92	58.52	63.13	67.74	72.35	76.96	81.57	86.17	90.78	95.39	100	
Milk	4.6	73.73	69.13	64.52	59.91	55.30	50.69	46.08	41.48	36.87	32.26	27.65	23.04	18.43	13.83	9.22	4.61	0	
Cream	46	27.54	32.37	37.20	42.03	46.86	51.69	56.52	61.35	66.18	71.01	75.84	80.67	85.51	90.34	95.17	100		
Milk	4.6	72.46	67.63	62.80	57.97	53.14	48.31	43.48	38.65	33.82	28.99	24.16	19.33	14.49	9.66	4.83	0		
Cream	44	28.93	34.00	39.09	44.16	49.24	54.31	59.39	64.47	69.54	74.62	79.69	84.77	89.85	94.92	100			
Milk	4.6	71.07	66.00	60.91	55.84	50.76	45.69	40.61	35.53	30.46	25.38	20.31	15.23	10.15	5.08	0			
Cream	42	30.48	35.83	41.17	46.52	51.87	57.22	62.56	67.91	73.26	78.61	83.95	89.30	94.65	100				
Milk	4.6	69.52	64.17	58.83	53.48	48.13	42.78	37.44	32.09	26.74	21.39	16.05	10.70	5.35	0				
Cream	40	32.20	37.85	43.50	49.15	54.80	60.45	66.10	71.75	77.40	83.05	88.70	94.35	100					
Milk	4.6	67.80	62.15	66.50	50.85	45.20	39.55	33.90	28.25	22.60	16.95	11.30	5.65	0					
Cream	38	34.13	40.12	46.12	52.10	58.08	64.07	70.06	76.05	82.04	88.02	94.01	100						
Milk	4.6	65.87	59.88	53.88	47.90	41.90	35.93	29.94	23.95	17.96	11.98	5.99	0						
Cream	36	36.31	42.67	49.04	55.41	61.78	68.15	74.52	80.89	87.26	93.63	100							
Milk	4.6	63.69	57.33	50.96	44.59	38.22	31.85	25.48	19.11	12.74	6.37	0							
Cream	34	38.77	45.58	52.38	59.18	65.99	72.79	79.59	86.39	93.20	100								
Milk	4.6	61.23	54.42	47.62	40.82	34.01	27.21	20.41	13.61	6.80	0								
Cream	32	41.61	48.90	56.20	63.50	70.80	78.10	85.40	92.70	100									
Milk	4.6	58.39	51.10	43.80	36.50	29.20	21.90	14.60	7.30	0									
Cream	30	44.88	52.76	60.63	68.50	76.38	84.25	92.13	100										
Milk	4.6	55.12	47.24	39.37	31.50	23.62	15.75	7.87	0										
Cream	28	48.72	57.26	65.81	74.36	82.91	91.45	100											
Milk	4.6	51.28	42.74	34.19	25.64	17.09	8.55	0											
Cream	26	53.27	62.62	71.96	81.31	90.65	100												
Milk	4.6	46.73	37.38	28.04	18.69	9.35	0												
Cream	24	58.76	69.07	79.38	89.69	100													
Milk	4.6	41.24	30.93	20.62	10.31	0													
Cream	22	65.52	77.01	88.51	100														
Milk	4.6	34.48	22.99	11.49	0														
Cream	20	74.03	87.01	100															
Milk	4.6	25.97	12.99	0															
Cream	18	85.07	100																
Milk	4.6	14.93	0																

TABLE 9.—*Cream standardization with 4.8 per cent whole milk*

	Fat (per cent)	Percentage of fat in cream desired																	
		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
		Percentage, parts, or pounds per 100 pounds of mixture																	
Cream	50	24. 78	29. 20	33. 63	38. 05	42. 48	46. 90	51. 33	55. 75	60. 17	64. 60	69. 02	73. 45	77. 87	82. 30	86. 72	91. 15	95. 57	100
Milk	4. 8	75. 22	70. 80	66. 37	61. 95	57. 52	53. 10	48. 67	44. 25	39. 83	35. 40	30. 98	26. 55	22. 13	17. 70	13. 28	8. 85	4. 43	0
Cream	48	25. 93	30. 56	35. 18	39. 81	44. 44	49. 07	53. 70	58. 33	62. 96	67. 59	72. 22	76. 85	81. 48	86. 11	90. 74	95. 37	100	
Milk	4. 8	74. 07	69. 44	64. 82	60. 19	55. 56	50. 93	46. 30	41. 67	37. 04	32. 41	27. 78	23. 15	18. 52	13. 89	9. 26	4. 63	0	
Cream	46	27. 18	32. 04	36. 89	41. 75	46. 60	51. 45	56. 31	61. 16	66. 02	70. 87	75. 73	80. 58	85. 43	90. 29	95. 14	100		
Milk	4. 8	72. 82	67. 96	63. 11	58. 25	53. 40	48. 55	43. 69	38. 84	33. 98	29. 13	24. 27	19. 42	14. 57	9. 71	4. 86	0		
Cream	44	28. 57	33. 67	38. 78	43. 88	48. 98	54. 08	59. 18	64. 29	69. 39	74. 49	79. 59	84. 69	89. 80	94. 90	100			
Milk	4. 8	71. 43	66. 33	61. 22	56. 12	51. 02	45. 92	40. 82	35. 71	30. 61	25. 51	20. 41	15. 31	10. 20	5. 10	0			
Cream	42	30. 11	35. 48	40. 86	46. 24	51. 61	56. 99	62. 36	67. 74	73. 12	78. 49	83. 87	89. 24	94. 02	100				
Milk	4. 8	69. 89	64. 52	59. 14	53. 76	48. 39	43. 01	37. 64	32. 26	26. 88	21. 51	16. 13	10. 76	5. 38	0				
Cream	40	31. 82	37. 50	43. 18	48. 86	54. 55	60. 23	65. 91	71. 59	77. 27	82. 95	88. 64	94. 32	100					
Milk	4. 8	68. 18	62. 50	56. 82	51. 14	45. 45	39. 77	34. 09	28. 41	22. 73	17. 05	11. 36	5. 68	0					
Cream	38	33. 73	39. 76	45. 78	51. 81	57. 83	63. 85	69. 88	75. 90	81. 93	87. 95	93. 97	100						
Milk	4. 8	66. 27	60. 24	54. 22	48. 19	42. 17	36. 15	30. 12	24. 10	18. 07	12. 05	6. 03	0						
Cream	36	35. 90	42. 31	48. 72	55. 13	61. 54	67. 95	74. 36	80. 77	87. 18	93. 59	100							
Milk	4. 8	64. 10	57. 69	51. 28	44. 87	38. 46	32. 05	25. 64	19. 23	12. 82	6. 41	0							
Cream	34	38. 36	45. 20	52. 05	58. 90	65. 75	72. 60	79. 45	86. 30	93. 15	100								
Milk	4. 8	61. 64	54. 80	47. 95	41. 10	34. 25	27. 40	20. 55	13. 70	6. 85	0								
Cream	32	41. 18	48. 53	55. 88	63. 23	70. 59	77. 94	85. 29	92. 65	100									
Milk	4. 8	58. 82	51. 47	44. 12	36. 77	29. 41	22. 06	14. 71	7. 35	0									
Cream	30	44. 44	52. 38	60. 32	68. 25	76. 19	84. 13	92. 06	100										
Milk	4. 8	55. 56	47. 62	39. 68	31. 75	23. 81	15. 87	7. 94	0										
Cream	28	48. 28	56. 90	65. 52	74. 14	83. 76	91. 38	100											
Milk	4. 8	51. 72	43. 10	34. 48	25. 86	17. 24	8. 62	0											
Cream	26	52. 83	62. 26	71. 70	81. 13	90. 56	100												
Milk	4. 8	47. 17	37. 74	28. 30	18. 87	9. 44	0												
Cream	24	58. 33	68. 75	79. 17	89. 58	100													
Milk	4. 8	41. 67	31. 25	20. 83	10. 42	0													
Cream	22	65. 12	76. 74	88. 37	100														
Milk	4. 8	34. 88	23. 26	11. 63	0														
Cream	20	73. 68	86. 84	100															
Milk	4. 8	26. 32	13. 16	0															
Cream	18	84. 85	100																
Milk	4. 8	15. 15	0																

TABLE 10.—*Specific gravity and weights per gallon of milk and cream.*[1]

Composition		Specific gravity		Weight per gallon	
Fat	Milk solids not fat	20°/4° C.	10°/4° C.	68° F.	50° F.
Per cent	*Per cent*			*Pounds*	*Pounds*
0	9.00	1.035	1.037	8.63	8.65
4	8.54	1.031	1.033	8.59	8.61
8	8.28	1.026	1.029	8.55	8.58
12	7.92	1.020	1.025	8.50	8.54
16	7.56	1.015	1.021	8.46	8.51
20	7.20	1.011	1.017	8.43	8.48
24	6.84	1.007	1.014	8.40	8.46
28	6.48	1.004	1.012	8.37	8.44
32	6.12	1.000	1.010	8.34	8.42
36	5.76	0.997	1.007	8.31	8.40
40	5.40	0.993	1.005	8.28	8.38
44	5.04	----------	----------	8.25	8.36
48	4.68	----------	----------	8.22	8.34

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[1] Determined by the Bureau of Standards and published in the Journal of Agricultural Research, Vol. III., No. 3.

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